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§ SCORPII A SHORT-PERIOD BINARY.

The two fifth-magnitude components that form the close double-star Σ 1998 ($= \xi$ *Scorpii*) have been known to be in orbital motion since the time of STRUVE. Careful measures have therefore been made of this system by many double-star observers during the past seventy-five years, and several attempts have been made to compute the true orbit.

It has generally been assumed that the orbit is nearly circular and highly inclined toward the line of sight. This view was taken by SCHORR in his thorough discussion of the data in 1889 ("Inaugural Dissertation zu München"), and by SEE in 1895 ("Evolution of the Stellar Systems"), the results obtained by these two computers being very similar. They give values of 105 and 104 years, respectively, for the periodic time, 0.12 and 0.13 for the eccentricity, and 68° and 70° for the inclination.

My measures of this pair during the past seven years indicate a very different form of orbit, for they give the following residuals from the places computed from SEE's elements:—

Date.	$\Delta \theta$ (O - C)	$\Delta \rho$
1898.17	+ 1°.2	+ 0".03
1899.35	+ 3 .3	— 0 .05
1901.47	+ 9 .9	— 0 .19
1903.51	+ 27 .9	— 0 .29
1904.40	+ 55 .3	— 0 .37
1905.30	+ 100 .9	— 0 .34

From these measures it appears that the motion instead of being slow is now very rapid, and that the pair is now a difficult one to observe with the 36-inch telescope instead of being an easy object for an instrument of small aperture.

Plotting these measures and all others that were available, I found it possible to satisfy them with an apparent ellipse that yielded a very eccentric orbit with a period of only 44.5 years. To do this it was necessary to change by 180° the angles given by observers up to the year 1862. But the two components are so nearly equal in magnitude that this may be done legitimately. In fact, both SCHORR and SEE made such correction to HERSCHEL's angle.

The details of my work are given in a forthcoming *Lick Observatory Bulletin*. The elements now computed are as follows:—

True Orbit.	Apparent Orbit.
$P = 44.5$ years	Length of major axis $1''.464$
$T = 1905.4$	Length of minor axis 0.802
$e = 0.767$	Dist. of star from center 0.561
$a = 0''.701$	Angle of major axis $11^\circ.0$
$\omega = 352^\circ.6$	Angle of perihelion 13.5
$\Omega = 20.4$	Position angles increasing.
$i = \pm 29.1$	

These results are considered as approximate only. The apparent motion of the companion will be so rapid during the next few years that data will soon be available for a more complete discussion of the theory of the system than seems advisable at present.

R. G. AITKEN.

May 29, 1905.

NEW COMPANIONS TO THREE STRUVE DOUBLE STARS.

In the course of my systematic search for new double stars I have recently found additional close companions to the well-known pairs, $\Sigma 419$, $\Sigma 1000$, and $\Sigma 1823$. The mean results of my measures of the new and old companions are as follows:—

$\Sigma 419$.

1905.13	$347^\circ.4$	$0''.44$	$7.4 - 9.8$	2^n	B and C. New.
1905.13	$73^\circ.6$	$3''.08$	$7.2 - 7.3$	2	A and B = $\Sigma 419$.

$\Sigma 1000$.

1904.95	$313^\circ.8$	$0''.27$	$8.2 - 8.5$	2^n	A and B. New.
1904.94	66.8	22.29	$8.0 - 9.0$	1	AB and C = $\Sigma 1000$.

$\Sigma 1823$.

1905.34	$239^\circ.2$	$0''.21$	$9.0 - 9.5$	2^n	A and B. New.
1905.34	149.6	3.49	$8.7 - 9.7$	2	AB and C = $\Sigma 1823$.

My measures of $\Sigma 419$ and $\Sigma 1000$ give practically the same results as those obtained by STRUVE seventy-five years earlier. STRUVE's measure of $\Sigma 1823$ is:—

$$1830.0 \quad 156^\circ.1 \quad 3''.35 \quad 8.5 - 9.5.$$

May 23, 1905.

R. G. AITKEN.